REMARKS

In the Office Action of August 13, 2004, claims 67-120 are allowed. However, claims 61-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yeldener (U.S. Patent No. 5,999,897) in view of Iyengar et al. (U.S. Patent No. 5,455,888).

US Patent 5,999,897 (Yeldener)

The examiner states that, with regard to independent claims 61 and 64, Yeldener discloses a device for recovering a high frequency content of a wideband signal previously down-sampled and for injecting said high frequency content in an over-sampled synthesized version of said wideband signal to produce a full-spectrum synthesized wideband signal, said high-frequency content recovering device comprising: a random noise generator for producing a noise sequence having a given spectrum.

The examiner also indicates that Yeldener does not disclose a spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal and a signal injection circuit for injecting said spectrally-shaped noise sequence in said over-sampled synthesized signal version to thereby produce said full-spectrum synthesized wideband signal.

US Patent 5,455,888 (Iyengar et al.)

The examiner further states that Iyengar et al. discloses the spectral shaping unit and signal injection circuit and that it would have been obvious to one of ordinary skill in the art to modify Yeldener to incorporate the spectral shaping unit and the signal injection circuit as taught by Iyengar et al. in order to provide for an artificial wideband speech signal which is of better quality than a narrowband speech signal, without modifying the existing network to actually carry the wideband speech.

The above examiner's statements are respectfully traversed for the following reasons.

Iyengar et al. describes in column 7, lines 51-54 that "the noise generator 68 passes a white noise signal, at the same power level as the pitch residual signal, through the pitch synthesis filter 70 to reintroduce the appropriate line spectrum component in the highband."

Iyengar et al. further describes in column 7, lines 57-64 that "the pitch analysis uses a one-tap pitch synthesis filter given in Z-transform notation by:

$$\frac{1}{1-\beta z^{-L}}$$

where ß is the pitch coefficient and L is the lag."

Iyengar et al. still further describes in column 8, lines 12-17 that:

Generation of the artificial wideband excitation is achieved by passing a noise signal, with the same spectral characteristics as the pitch residual output from the inverse filter 64, through the corresponding pitch synthesis filter 70. The pitch synthesis filter 70 adds in the appropriate line spectrum throughout the whole band.

And Iyengar et al. describes in column 8, lines 21-36 that:

a noise generator 68 is used to generate a white Gaussian noise signal having a bandwidth of 0 to 8 kHz and the same spectral level as the narrowband excitation signal. The output of the noise generator 68 is used to drive the pitch synthesis filter 70, H(z) given by equation 13:

$$H(z) = \frac{1}{1-\beta z^{-Lopt}} \qquad (13)$$

where

$$\beta = 0.9\beta_{opt}$$

In order to slightly reduce the degree of periodicity in the highband, ß is used instead of ß$_{opt}$.

Therefore, while independent claims 61 and 64 of the present patent application define a spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to the down-sampled wideband sound signal (or equivalent method step as recited in claim 64), Iyengar et al. describes passing a white noise signal through a pitch synthesis filter to reintroduce the appropriate line spectrum component in the highband, wherein the pitch synthesis filter uses a one-tap pitch synthesis filter given in Z-transform notation by:

$$\frac{1}{1-\beta z^{-L}}$$

where ß is the pitch coefficient and L is the lag.

Col. 7, lines 60-64.

Accordingly, in Iyengar et al, the white noise signal is processed through a pitch synthesis filter to reintroduce the appropriate line spectrum component in the highband; therefore, this signal is processed in relation to the pitch parameters β (pitch coefficient) and L (lag).

On the contrary, in independent claims 61 and 64 of the present patent application, the noise sequence is shaped in relation to the linear prediction filter coefficients. In the illustrative example of page 44 of the present patent application, the noise is processed through a bandwidth expanded version of the LP synthesis filter used in the down-sampled domain (1/Â(z/0.8)). As described on page 19 of the present patent application, the parameters a_i are the coefficients of the transfer function of the LP filter, which is given by the following relation:

$$A(z) = 1 + \sum_{i=1}^{p} a_i z^{-1}$$

Accordingly it is respectfully submitted that Iyengar et al. describes processing a noise signal in relation to pitch parameters β (pitch coefficient) and L (lag) and, therefore, cannot teach

Yeldener to process the noise signal or sequence in relation to linear prediction (LP) filter coefficients.

Obviously, filtering a noise signal in relation to pitch filter parameters is not equivalent to filtering a noise sequence in relation to LP filter coefficients; the two processes lead to different results.

New claims 121-128 have been added to better reflect the characteristic that the spectral shaping comprises filtering the noise sequence in relation to a bandwidth expanded version of the linear prediction filter coefficients to produce a filtered noise sequence characterized by a frequency bandwidth generally higher than a frequency bandwidth of the over-sampled synthesized signal version. As explained hereinabove, this subject matter is believed to clearly distinguish the present invention over Yeldener and Iyengar et al, taken separately or in combination.

Although no arguments are presented regarding the patentability of claims 122, 123, 125 and 126, this should not be construed as an admission that these claims contain no patentable subject matter. Since claims 122, 123, 125 and 126 are dependent upon independent claims that are believed to be patentable, these claims are believed to be allowable in the present patent application.

As requested by the examiner:
- An abstract of the disclosure is submitted;
- The indentation of claim 93 has been deleted; and
- Claim 112 has been amended as suggested by the examiner.

Regarding the Examiner's request to move line 26 of page 11 to page 12, such an amendment can not be shown under the rules for amending the specification. Moreover, when the application is passed to the printer before grant, the current placement of the heading in the application will be irrelevant. Reconsideration and withdrawal of this suggestion by the examiner is therefore respectfully requested.

In view of the above amendments and remarks, early reconsideration of the present patent application is respectfully requested.

Dated: January 5, 2005

Respectfully submitted,

By _Laura C. Brutman_
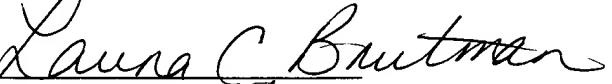
Laura C. Brutman
   Registration No.: 38,395
DARBY & DARBY P.C.
P.O. Box 5257
New York, New York 10150-5257
(212) 527-7700
(212) 753-6237 (Fax)
Attorneys/Agents For Applicant